$$\frac{\cot x}{\cot x} \cdot \frac{\cot x}{1} + \frac{1}{\cot x}$$

$$\frac{\cot^2 x}{\cot x} + \frac{1}{\cot x} = \frac{\cot^2 x + 1}{\cot x} = \frac{\csc^2 x}{\cot x} = \frac{\frac{1}{\sin^2 x}}{\frac{\cos x}{\sin x}}$$

$$\frac{1}{4} + \frac{3}{4} = \frac{4}{4}$$

$$\frac{1}{\sin^{\cancel{2}} x} \cdot \frac{\cancel{\sin x}}{\cos x} = \frac{1}{\sin x \cos x}$$

$$\frac{\sec x}{\sec x}\cdot\frac{\sec x}{\csc x} + \frac{\csc x}{\sec x}\cdot\frac{\csc x}{\csc x}$$

$$\frac{\sec^2 x}{\sec x \csc x} + \frac{\csc^2 x}{\sec x \csc x} = \frac{\sec^2 x + \csc^2 x}{\sec x \csc x}$$

$$\frac{\frac{\sin^2 x}{\sin^2 x}\cdot\frac{1}{\cos^2 x} + \frac{1}{\sin^2 x}\cdot\frac{\cos^2 x}{\cos^2 x}}{\frac{1}{\cos x \sin x}} \Rightarrow \frac{\frac{\sin^2 x}{\cos^2 \sin^2 x} + \frac{\cos^2 x}{\cos^2 x \sin^2 x}}{\frac{1}{\cos x \sin x}} = \frac{\sin^2 x + \cos^2 x}{\cos^{\cancel{2}} \sin^{\cancel{2}} x}\cdot\frac{\cancel{\cos x}\ \cancel{\sin x}}{1}$$

$$\frac{1}{\cos x \sin x}$$

$\tan x\,(\cot x + \csc x)$

$\downarrow$

$\dfrac{\sin x}{\cos x}\left(\dfrac{\cos x}{\sin x} + \dfrac{1}{\sin x}\right)$

$\dfrac{\cancel{\sin x}}{\cancel{\cos x}} \cdot \dfrac{\cancel{\cos x}}{\cancel{\sin x}} + \dfrac{\cancel{\sin x}}{\cos x\,\cancel{\sin x}}$

$1 + \dfrac{1}{\cos x}$

$1 + \dfrac{1}{\cos x}$

$1 + \sec x$

$\sin^2 x - 1$ factoring

$(\sin x + 1)(\sin x - 1)$

$\cos^2 x - 4$

$(\cos x + 2)(\cos x - 2)$

$\cos^2 x - 3$

$(\cos x + \sqrt{3})(\cos x - \sqrt{3})$

$(x-1)(x+1) = x^2 + x - x - 1$

$= x^2 - 1$

$(a+b)(a-b) = a^2 - b^2$

conjugate pairs $\longrightarrow (\tan x + 1)(\tan x - 1)$

$= \tan^2 x - 1$

Difference of squares

(61)

$$\frac{\sec^4 x - \tan^4 x}{\sec^2 x + \tan^2 x} = \sec^2 x - \tan^2 x$$

$$\frac{\cancel{(\sec^2 x + \tan^2 x)}(\sec^2 x - \tan^2 x)}{\cancel{\sec^2 x + \tan^2 x}}$$

$$1(\sec^2 x - \tan^2 x)$$

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$$(\sin x+1)^2-(\sin x-1)^2$$

$$x^2-y^2$$

$$(x+y)(x-y)$$

$$\left(\underset{x}{(\sin x+1)}+\underset{y}{(\sin x-1)}\right)\left(\underset{x}{(\sin x+1)}-\underset{y}{(\sin x-1)}\right)$$

$$(2\sin x)\cdot(2)=\boxed{4\sin x}$$

$\boxed{\text{HW}}$

Sect. 5.2 # 41, 42, 44, 49, 61, 63 67, 69